Module 7 Overview

Introduction

> *"Every man if he so desires becomes sculptor of his own brain."*
> *-- Santiago Ramón y Cajal*

This module introduces the Gaussian Processes for Machine Learning. In this module we are going to see only the linear approach, and their generalization will be given in next module. Here we will see the learning criterion for GP, which is based on the Bayes rule. This approach gives not only an estimation or prediction of an unknown regressor, but a probability distribution of the predicted value. This adds value to the prediction since we will be able to determine how good or bad it is.

First, we review the Bayes Theorem, which will be particularized for the case of a linear estimator. Then, we will make the derivation of the learning criterion. It consists of the maximization of the likelihood of the training regressions with respect to the input, or the training predictors. It is particularly important to remember that the weight vector **w** is not treated as a set of parameters, but as a latent random variable, which will be given a probability distribution. We will finish the module with some examples.

Learning Objectives

By completing the activities for this module, students will be able to:

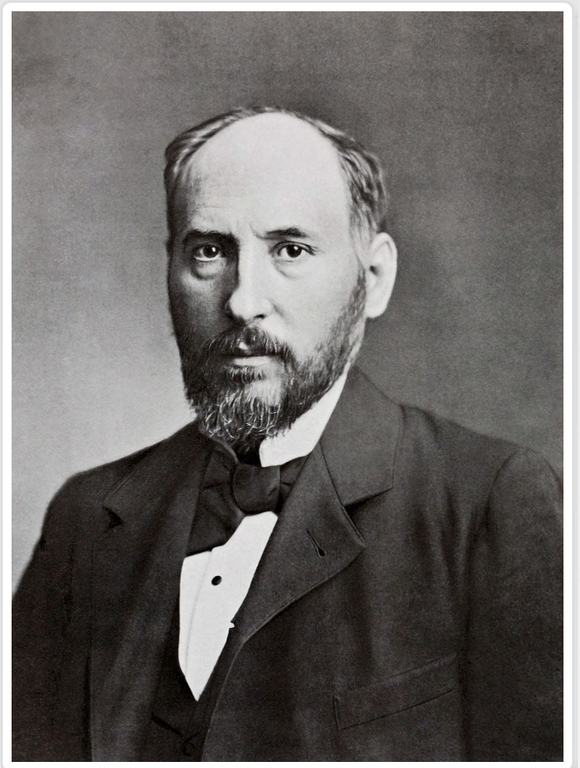
- Provide a reasoning of the GP criterion.
- Recognize the advantage of the GP over other approaches, and the trade-off represented by the fact that the data needs now a probabilistic (Gaussian) model.
- Construct a linear multivariate GP and discuss about its behavior.

Required Instructional Materials

- The required materials are the slides and the problem statements for the assessments. Students are encouraged to use book Gaussian Processes for Machine Learning, C. Rasmussen et al. This book has free access online.

Activities

Students are required to follow the lessons and to turn in two assesments. Also, students are encouraged to use the discussion board to post questions or answer questions posted by other stiudents.



Santiago Ramón y Cajal

Spanish neuroscientist. 1906 Medicine Nobel Prize. DIscoverer of the neuron cell.

Module 7 Summary

- Lesson slides
- GP Software installation
- 2 assesments
- Weekly discussion

If you have questions about some aspect of Learn, **UNM LEARN Support** is available to troubleshoot technical problems.

Contact them 24/7 at 505-277-0857, 1-877-688-8817 or use the "Create a Support Ticket" link on the left Course Menu.